



## **The Effectiveness of the Utilization of Plastic Waste into Handicrafts as a Learning Media in Improving Fine Motor Skills, Creativity, and Environmental Concern for Early Childhood in Kindergarten Perjuangan**

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### **Abstrak**

Penumpukan sampah plastik menjadi isu lingkungan global yang memerlukan penanganan sejak dini melalui jalur pendidikan formal. Kegiatan pengabdian masyarakat melalui Kuliah Kerja Nyata (KKN) mahasiswa KKN Kelompok 6 ini bertujuan untuk menguji dan mendeskripsikan efektivitas pemanfaatan limbah plastik menjadi kerajinan tangan sebagai media pembelajaran dalam meningkatkan keterampilan motorik halus, kreativitas, dan karakter kepedulian lingkungan pada anak usia dini di TK Perjuangan, Kelurahan Pekan Sabtu, Bengkulu. Metode penelitian yang digunakan adalah deskriptif kualitatif. Data dikumpulkan melalui observasi partisipatif, wawancara mendalam dengan para pendidik, serta dokumentasi hasil karya anak. Hasil program menunjukkan bahwa aktivitas memotong, menempel, dan merangkai limbah plastik yang didampingi oleh tim KKN Kelompok 6 secara signifikan menstimulasi koordinasi mata dan tangan (motorik halus) anak. Proses mendesain botol dan sedotan bekas menjadi pot tanaman atau tempat pensil terbukti memicu kemampuan imajinasi dan orisinalitas ide (kreativitas). Selain itu, keterlibatan langsung dalam mengolah sampah menumbuhkan pembiasaan karakter peduli lingkungan sejak usia emas. Evaluasi menggunakan indeks dampak perkembangan anak menunjukkan tingkat efektivitas program sebesar 92,5% (kategori sangat tinggi). Dengan demikian, pemanfaatan bahan bekas non-pabrikasi berpotensi besar menggantikan media pembelajaran konvensional sekaligus menjadi pilar edukasi ekologis di tingkat anak usia dini.

**Keywords:** Limbah Plastik, Motorik Halus, Kreativitas, Kepedulian Lingkungan, TK Perjuangan, KKN Kelompok 6

### Abstract

The accumulation of plastic waste has become a global environmental issue that requires early intervention through formal education. The community service program, conducted through the Student Community Service Program (KKN) of Group 6 students, aims to test and describe the effectiveness of utilizing plastic waste into handicrafts as a learning medium to improve fine motor skills, creativity, and environmental awareness in early childhood at Perjuangan Kindergarten, Pekan Sabtu Village, Bengkulu. The research method used was descriptive qualitative. Data were collected through participatory observation, in-depth interviews with educators, and documentation of children's work. The program results showed that the activities of cutting, pasting, and assembling plastic waste, accompanied by the Group 6 KKN team, significantly stimulated children's eye-hand coordination (fine motor skills). The process of designing used bottles and straws into plant pots or pencil cases was proven to stimulate imagination and originality of ideas (creativity). In addition, direct involvement in waste processing fosters the habit of caring for the environment from a golden age. Evaluation using the child development impact index showed a program effectiveness rate of 92.5% (very high category). Thus, the use of non-manufactured used materials has great potential to replace conventional learning media and become a pillar of ecological education at the early childhood level.

**Keywords:** *Plastic Waste, Fine Motor Skills, Creativity, Environmental Awareness, Kindergarten Struggle, KKN Group 6*

### Research Background

Early Childhood Education (PAUD) is a crucial phase in human life which is often referred to as the *golden age*. At this time, all aspects of child development—from motor, cognitive, linguistic, social-emotional, to moral values and character—are in a very flexible and sensitive state to be stimulated. One of the biggest challenges in the modern world of early childhood education is how to design a learning media that is not only able to hone the physical-motor aspects and thinking intelligence of children, but also instill social sensitivity to the preservation of the surrounding environment from an early age. Learning media basically plays a strategic role as an intermediary of information and concrete stimulation so that material can be optimally absorbed by children's five senses (Asnawir & Usman, 2002). Conventional teaching patterns that rely too much on rigid manufacturer media often fail to bridge the needs of children's emotional and motor development in a balanced manner (Lutfi & Kartika, 2023).

Therefore, a breakthrough is needed in the form of the use of digital and non-digital media based on local environmental materials in order to give birth to a meaningful learning process for students.

In addition to these instructional challenges, the world is currently besieged by a global ecological crisis, particularly the accumulation of plastic waste that is difficult to decompose. The accumulation of plastic waste in urban residential environments requires integrative handling, one of which is through school-based environmental education pathways. The principle of *sustainable education* must begin to be emphasized in the governance of PAUD so that the values of nature conservation are firmly embedded from the earliest development phase (Nurhayati, 2021). Internalizing the values of nature conservation in children requires the formulation of concrete media that is adaptive so as not to cause boredom in children and to be able to touch the psychomotor realm simultaneously

(Kurniasih, 2019). When plastic waste is moved from landfills to creativity desks in classrooms, children will learn to see new value in something previously considered dirty and useless. The adaptation of an environment-based curriculum through the provision of environmentally friendly media such as waste sorting techniques is very urgent in order to give birth to a generation of the modern century who are intelligent and have high ecological empathy (Rahmah & Mubarak, 2025; Rahayu et al., 2025).

This research on service and instructional analysis takes the locus at Perjuangan Kindergarten. Administratively, this early childhood education institution is located in the Pekan Sabtu Village area, Selebar District, Bengkulu City, Bengkulu Province. TK Perjuangan stands in a rapidly developing sub-urban area with dynamic environmental characteristics. The geographical location of this school is very strategic because it is surrounded by residential areas, but on the other hand it is close to the local business district which is one of the contributors to the volume of daily plastic waste. Accessibility to the school location is very easy to reach by two-wheeled and four-wheeled vehicles, making Perjuangan Kindergarten a potential children's education center to test a learning model based on the use of domestic waste in an inclusive manner.

Demographically, the people of Pekan Sabtu Village are dominated by a very heterogeneous sociological background but have strong mutual cooperation ties. The livelihoods of residents around the school are very varied, including farmers, construction workers, market traders, and state civil servants. This economic heterogeneity has a linear impact on the variation in child-rearing at home. The residents of Pekan Sabtu Village are known to have a good concern for the formal education of their children, as evidenced by the high participation rate of sending children to school at Perjuangan Kindergarten. However, the level of collective awareness about independent plastic waste management in the household

environment is still relatively low, so that the environment around settlements is often still found with bottles, drinking cups, and used plastic bags that have the potential to interfere with the aesthetic health of the environment.

When analyzed from the perspective of the *Asset-Based Community Development* (ABCD) methodology, TK Perjuangan has an abundance of internal assets that are very rich and ready to be activated. These assets include human assets in the form of the dedication of early childhood education teachers who are adaptive to innovation, as well as the high enthusiasm of dozens of students aged 4-6 years. In addition, there is physical assets in the form of a large school yard for an open play area and social assets in the form of support from local environmental administrators and guardians of students. Students and researchers mapped all of these internal forces to be mobilized independently without having to rely on the procurement of expensive manufacturers' educational game equipment (APE) from outside the city. The potential for abundant plastic waste around Pekan Sabtu Village has been changed from a "problem" (*liability*) to an "asset" of learning (*asset*) with high use value.

The fundamental challenge behind this study is the lack of variety of learning media in Perjuangan Kindergarten that is able to combine fine motor aspects, creativity, and love for the environment at the same time. Teachers are often stuck using children's worksheets (LKAs) with picture paper that train children to color or thicken lines only. This passive instructional pattern makes the muscles of the child's fingers less stimulated optimally, so the development of fine motor coordination tends to be slow. The clash between conventional teaching habits and the demands of meeting the motor needs of today's children often hinders the effectiveness of motor and cognitive skill transfer if it is not balanced with creative visual media assistance (Yuniarti et al., 2023). Furthermore, failure to design a classroom atmosphere that challenges

children's gross and fine motor skills risks significantly lowering students' intrinsic learning motivation (Yusuf, 2023).

The physical condition of early childhood that requires repeated tactile stimulation (touch) is an urgent reason why this plastic waste treatment program must be implemented immediately at the Perjuangan Pekan Saturday Kindergarten. Children are in a concrete operational phase where they need real objects that can be held, cut, bent and strung together to work the flexibility of their finger muscles. Through the activity of processing plastic waste into handicrafts such as ornamental flowers, piggy banks, and toy cars, children are indirectly forced to perform precise fine motor movements. The integration of various educational game approaches that are challenging, persuasive, and friendly to nature is an absolute must in the modern education ecosystem to attract children's interest in learning (Aransyah et al., 2023). Teaching instruments that are packaged contextually by utilizing surrounding waste have been proven to be able to drastically boost children's creativity and ecological empathy (Alifah et al., 2023). Based on all these empirical considerations, research on the effectiveness of the use of plastic waste into handicrafts as a learning medium is important to be presented as a complete journal draft for the advancement of the quality of children's education in Bengkulu City.

### Research Methodology

This service research relies on a qualitative descriptive method combined with the Asset-Based Community Development (ABCD) approach. The operational steps of environmental project-based learning are systematically designed through a cycle of four main stages (4D cycle) as follows:

Discovery → Dream → Design → Destiny

- **Discovery (Discovery of Waste Assets):** Teachers and students at Perjuangan Kindergarten carried out

mapping movements and collected clean plastic waste (such as mineral bottles, colorful straws, and bottle caps) around the Pekan Saturday Village environment.

- **Dream:** Hold a classroom discussion forum where children are stimulated to imagine what toys or display objects they want to make from piles of plastic waste that have been collected together.
- **Design (Design and Manufacturing Action):** Children with the strict guidance of the teacher begin to do fine motor activities such as cutting plastic according to the pattern, gluing using child-friendly adhesive components, and sorting out the color of the bottle caps to be used as wheels or flower decorations.
- **Destiny (Exhibition and Sustainability Action):** Holding a mini work (mini exhibition) in the hall of Struggle Kindergarten which was attended by parents from the Pekan Saturday environment, accompanied by the daily habit of providing plastic sorting bins in the school environment to maintain the curiosity of environmentally conscious characters.

### Results and discussion

The implementation of the program to use plastic waste into handicrafts at Kindergarten Perjuangan Pekan Village Saturday showed very significant success in three aspects of child development achievements. In the fine motor aspect, physical activities such as holding scissors, directing pieces following the groove of the bottle circle, and inserting rope into the hole of the used bottle cap have been proven to stimulate the maturity of the child's intrinsic muscles of the hand on a regular basis. Consistent fine motor stimulation through cutting and shearing activities has been proven to be effective in training the grip strength of fine motor coordination (Asmara, 2020). The use of domestic waste recycled materials as Educational Toys (APE) is also simultaneously able to accelerate the

independence of tactile movements in children (Fitriati et al., 2025). Through intensive instructional guidance, children who initially had difficulty holding a pencil correctly now show *firm grip strength* and flexible finger flexibility. Training interventions for manipulating non-manufactured used materials have been proven to be able to boost the quality of eye and hand coordination in early childhood significantly through the optimization of creative crafts (Hadi & Jauhari, 2025; Pratiwi & Wedayanthi, 2025). The learning atmosphere becomes full of concentration and caution that trains children's self-regulation.

In terms of creativity, the use of plastic waste provides absolute freedom for children to explore their imagination without fear of being wrong. In contrast to manufactured media that already have a standard shape, empty plastic bottles force children to think divergently and train their right hemisphere through artistic stimulation (Purwanti et al., 2021). This exploration pattern trains children's creative thinking framework theoretically and practically (Kupers et al., 2016). A spark question like: *"Do you want this bottle to be turned into a piggy bank, a flying rocket, or a flower pot?"* motivate children to innovate to turn used goods into functional crafts in art subjects (Agustina & Sunarso, 2018; Hanafi & Sujarwo, 2015). The children of Kindergarten Perjuangan have succeeded in spawning unique works that vary with a high level of originality of ideas. The use of teaching instruments based on the use of environmental waste is very effective in multiplying children's enthusiasm and creativity because it triggers simultaneous visual and spatial engagement (Aritonang et al., 2026; Kurniawan et al., 2025). Through the technique of modifying used goods into versatile environmentally friendly products, children are no longer passive spectators, but the main actors of their own toy makers (Husen et al., 2025). The learning concentration of school-age children will be optimally conditioned when they are in a

learning environment rich in manipulative stimuli (Dewi et al., 2022; Wijaya et al., 2021).

In the aspect of environmental concern, the transformation of values occurs organically in the child's soul. Through the teacher's narration at the beginning of the class about the dangers of waste for marine and earth life, children internalize this knowledge into real daily actions. The use of MSME plastic waste as a creative collage medium has proven to be effective in multiplying ecological awareness in children of golden age (Syaputra et al., 2025). The use of collage sticky art techniques is very functional in honing children's cognition as well as sensitivity to the environment (Palintan & Saria, 2018). The children of Perjuangan Kindergarten now have a new habit of refusing to litter plastic waste in the Pekan Sabtu Village environment and spontaneously pick up empty bottles to take to school as capital to make the next work. An environment-based curriculum requires educators to get rid of all forms of rigid indoctrination and replace them with practical habituation that is full of ecological meaning, while being part of the empowerment of rural and suburban communities (Fauzi & Handayani, 2022; Aliyyah et al., 2018). Children who are educated to love the earth through plastic recycling art activities that are valuable to be proven to have long-term social sensitivity to the preservation of the surrounding nature (Faizah et al., 2020; Saputra & Lestari, 2024).

To measure the effectiveness of this teaching program quantitatively-descriptively, the research team distributed a structured developmental observation questionnaire to 30 students at Perjuangan Kindergarten in Saturday Week. Based on the tabulation results of the development evaluation instrument, the average learning success score (*Child Development Impact Index*) was obtained of 92.5% (Very High Category). A program approach that touches the psychomotor and affective realms of

students in a balanced manner triggers the success of massive character value transfer (Mubaroq et al., 2025). In order to ensure the sustainability of this program, periodic coordination between stakeholders at school and home must be well maintained because the sustainability of teaching innovation at the local level is determined by the consistency of parenting (Syabrina et al., 2024). The full results of the effectiveness analysis tabulation are presented in the table below:

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**Table 1. Analysis of Learning Effectiveness Based on the Child Development Impact Index**

| Ye<br>s | Child<br>Developme<br>nt<br>Achieveme<br>nt<br>Indicators                              | Capaiain<br>Score<br>(%) | Qualitati<br>ve<br>Categorie<br>s |
|---------|----------------------------------------------------------------------------------------|--------------------------|-----------------------------------|
| 1       | Improved control of eye coordination and finger flexibility (Fine Motor)               | 91,8%                    | Very High                         |
| 2       | Improvement of the fluency of ideas and originality of the form of crafts (Creativity) | 93,4%                    | Very High                         |
| 3       | Active involvement and children's excitement during the craft-making process           | 94,1%                    | Very High                         |

|   |                                                                              |              |                  |
|---|------------------------------------------------------------------------------|--------------|------------------|
| 4 | Active involvement and children's excitement during the craft-making process | 90,7%        | Very High        |
| - | <b>Average Child Development Impact Score</b>                                | <b>92,2%</b> | <b>Very High</b> |

Based on the statistical exposure of the data in Table 1, the average acquisition of a child development impact index of 92.5% validly confirms that the use of plastic waste as a learning medium in Kindergarten Perjuangan Kelurahan Pekan Saturday was accepted with an extraordinary success rate. This high percentage figure shows that the integration of environmental issues into children's gross and fine motor activities is able to solve the problem of learning boredom that has plagued early childhood due to the use of monotonous paper media. This social and instructional success is triggered by a paradigm shift in children who now view garbage not as a disgusting object, but as a raw material for challenging and fun play.

If explained per indicator, the third indicator that measures the habit of sorting waste and disposing of it in its place (Environmental Care) scored the highest, which was 94.1%. This very high achievement proves that early childhood has an extraordinary capacity for moral adaptation if educated through examples of concrete actions (learning by doing). The plastic waste treatment instruments reported in this draft journal are purely the result of an innovative design that is adjusted to the sociographic environmental conditions of

Pekan Sabtu Village in order to have a real impact on the formation of children's character in Bengkulu City.

The method of interlude environmentally themed songs, colorful visualization of plastic waste that attracts children's attention, and teacher awards in the form of achievement stars make children feel appreciated in every creative process. The psychological condition of children who are free from verbal pressure makes their brain waves in a relaxed state and ready to absorb tactile stimuli, so that the level of flexibility of their finger muscles (indicator 1 reaches 91.8%) develops optimally beyond the standard target of development of their age.

In the indicators of teacher readiness and active involvement of children (90.7%), field findings were obtained that teachers in Perjuangan Kindergarten have now included this used goods utilization program in the draft of the Daily Learning Implementation Plan (RPPH) periodically. Parents of students at home also reported a positive impact, where their children often reminded family members at home not to litter. The synergy between education at school and habituation at home is very crucial for the solidity of children's character foundations, because the desire for a character education program cannot depend on class activities alone, but must be transformed into part of the organic family cultural habits in Pekan Sabtu Bengkulu Village.

### **Conclusion**

The implementation of the learning media development program through the use of plastic waste into handicrafts at the Perjuangan Kindergarten in Pekan Saturday Village, Selebar District, Bengkulu City has been proven to be empirically effective in improving children's fine motor skills, stimulating divergent creativity, and strengthening the background of

environmental concern since the golden age. Through the application of structured project-based learning methods, children were able to achieve an average development index of 92.5%. The integration of plastic waste processing has succeeded in proving that the process of physical-motor stimulation of early childhood runs much more optimally when facilitated by concrete objects that challenge the imagination and are in direct contact with the reality of environmental conservation around them.

As a form of Follow-up Plan (RTL) to ensure the independence of this program, it is recommended to all educators at Perjuangan Kindergarten to compile a guidebook for the ecological recreation cycle, expand the variety of waste materials (such as cardboard or used patchwork), and hold regular exhibitions of recycled artworks at the sub-district level in collaboration with parents.

### **Acknowledgment**

The author expresses his gratitude and highest appreciation to the Principal and the entire teacher council of Kindergarten Perjuangan Pekan Saturday Bengkulu Village who have provided research permits, technical assistance in data collection, and outstanding synergy during the implementation process of the teaching program. Sincere gratitude is also expressed to the government of Pekan Sabtu Village, Selebar District, Bengkulu City, as well as all parents of students who have fully supported the provision of clean plastic waste raw materials for the smooth running of this early childhood ecological education activity.

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